REMARKS

With the present submission, claims 1-5 and 7-12 remain pending. Claim 1 is currently amended, and claim 6 is canceled. No claims are newly added.

Claims 1-6 and 8-11 stand rejected under 35 U.S.C. § 102(b) as anticipated by Billig et al. (U.S. Patent No. 5,214,914). Claims 1-6 and 8-*12* are rejected under 35 U.S.C. § 103(a) as obvious over Billig et al. With respect to claim 6, because the claim is canceled, the rejections are moot. With respect to the other claims, applicants respectfully submit that the rejections should be withdrawn.

In Billig et al., an air inlet of a combustion chamber comprises multiple varying structures to enable a single engine to operate in a wide range of speed, for example, Mach 0 to Mach 25. One such varying structure includes translatable cowl 1, which rotates about pivot point 3 to vary the distance from lip 2 to the surface of the main body of flight vehicle 4. Another variable structure results from the insertion and retraction of propellant injection struts 6 into and out of the air inlet. Billig et al. discloses that the variable structures enable control of air flow, air compression, shock positioning, and fuel injection and distribution.

Although the Billig et al. apparatus may be a means to some of the same goals as those of the applicants, the Billig et al. means to achieve those goals differ significantly from those of the applicants. That is, applicants' invention has air channels formed by the shape of the rocket jets exhausted from rocket engines arranged on the struts. Varying the areas of the air channels enables the optimal control of airflow into the combustion chamber, combustion pressure in the combustion chamber, and exhaust gas flow from the combustion chamber. This airflow is controllable according to flight speed. In brief, applicants' utilization of the rocket jets' fluid

energy enables internal fluid flows in the combined engine to be optimally controlled at a wide range of speed from take–off to orbit *without* mechanically-variable structures.

To emphasize the above-discussed distinctions between applicants' invention and the Billig et al. apparatus, claim 1 is now amended to explicitly recite that the engine operates "without any mechanical variable structures." Claims 2-5 and 8-12 depend from claim 1, so they implicitly recite this subject matter. For at least the reason of this amendment alone, the anticipation rejection should be withdrawn.

Claim 2 additionally specifies that the combustion chamber of applicants' engine comprises the following sections:

(1) a jet and airflow coexisting section in which both the rocket jets and airflows introduced through the air introduction channels are present,
(2) a mixing section in which the rocket jets and the airflows are mixed to form mixed gas; and
(3) a combustion section in which said mixed gas is burnt.

Claims 3-5 and 8-11 depend from claim 2, so they recite this subject matter implicitly.

In contrast, when propellant injection struts 6 of Billig et al. operate as fuel injectors at speeds under Mach 10, the downstream region of the struts 6 comprises: (1) a *fuel* (not "jet," as claimed) and airflow coexisting section in which both the *fuel* and airflows introduced through the isolator areas 12 are present; (2) a mixing section in which the *fuel* and the airflows are mixed to form mixed gas; and (3) a combustion section in which the mixed gas is burnt. Moreover, the propellant injection struts 6 operate as rockets (thrust generators) at speeds exceeding Mach 10. Therefore, at speeds over Mach 10, there are no combustion reactions in the downstream region of struts 6.

In short, Billig et al. does not disclose: (1) a *jet* and airflow coexisting section in which both rocket *jets* and airflows introduced through air introduction channels are present: (2) a

mixing section in which the rocket *jets* and airflows are mixed to form mixed gas; and (3) a combustion section in which the mixed gas is burnt, as recited in claims 2-5 and 8-11.

Applicants add that, in Billig et al., in which the flow rate of the airflow is controlled by the variable structures (discussed above), no method or structure is disclosed for controlling the flow rate by varying the shape of the rocket jets exhausted from the rocket engines arranged on the struts. Furthermore, Billig et al. does not disclose anything regarding a combustion chamber and a diffuser. Thus, Billig et al. cannot teach or suggest applicants' invention.

For at least the reasons provided here, applicants request the withdrawal of the rejections of 1-6 and 8-12 based on Billig et al.

Claims 1-5 and 8-12 stand rejected under 35 U.S.C. § 103(a) as obvious over Bulman (U.S. Patent No. 5,205,119) in view of either Bouchez et al. (U.S. Patent No. 5,899,061) or Billig et al. Applicants respectfully submit that this rejection should be withdrawn.

Bulman discloses the periodic or oscillating deflection of jet flow to provide an efficient air induction system thereby improving the propulsive efficiency. Accordingly, Bulman discloses means to deflect the jet flow. However, as mentioned above, applicants' invention varies the shape of the rocket jets exhausted from the rocket engines arranged on struts to control internal fluid flows optimally in the combined engine. Therefore, the Bulman apparatus differs significantly from applicants' invention.

Bouchez et al. discloses that fuel injections are provided with regenerative cooling mechanisms to be operated between the speeds of Mach 12 and Mach 15. However, there is no teaching or suggestion of varying the shape of the jets exhausted from rocket engines arranged on struts to control the internal fluid flow in a combined engine, such as in that of the applicants.

The distinctions between the claimed invention and the disclosure of Billig et al. are discussed extensively above.

In view of this discussion, applicants submit that no combination of teachings or suggestions from Bulman, Bouchez et al., and Billig et al. would have motivated a modification of the prior art to obtain the claimed invention. Accordingly, applicants request the withdrawal the rejection based on these references.

Claim 7 is rejected under 35 U.S.C. § 103(a) as obvious over Billig et al. in view of Cohen (U.S. Patent No. 3,752,172) or over Bulman in view of Cohen. Applicants respectfully submit that this rejection should be withdrawn.

The Billig et al. and Bulman are discussed above.

Regarding Cohen, this reference discloses that disturbing the approach flow boundary layer of the supersonic stream promotes penetration of gaseous jets injected through a bounding wall into the supersonic cross flow. Accordingly, Cohen discusses exemplary means to disturb the approach flow boundary layer. However, as discussed above, applicants' invention operates by varying the shape of the rocket jets exhausted from the rocket engines arranged on struts to control optimally the internal fluid flow in the combined engine.

Therefore, Billig et al., Bulman, and Cohen, whether considered separately or combined, cannot teach or suggest applicants' claimed invention. Accordingly, withdrawal of the obviousness rejection based thereon is requested.

In view of the remarks above, applicants now submit that the application is in condition for allowance. Accordingly, a Notice of Allowability is hereby requested. If for any reason it is believed that this application is not now in condition for allowance, the Examiner is welcome to

contact applicants' undersigned attorney at the telephone number indicated below to discuss resolution of the remaining issues.

If this paper is not timely filed, applicants petition for an extension of time. The fee for the extension, and any other fees that may be due, may be debited from Deposit Account No. 50-2866.

Respectfully submitted,

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